PYLON

THE PYLON NETWORK

WHITEPAPER FOR THE PYLON TOKEN SALE

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CONTENT

1. INTRODUCTION

We are a team of engineers working closely with creative and conscious professionals both in the energy sector and in the blockchain developers' community. What brought us together in the first place and shall keep us bonded, is the impact that our actions have on our planet and the impact that decentralised technologies can have on our lifestyle and our evolution.

We have managed to make some steps towards a more sustainable future and we have made climate change a central perspective point in our decision-making. However, we still see so many antitheses between words, visions, roadmaps, hopes - and actions.

Two years ago, Jim Kim, the President of the World Bank urged governments to remove global subsidies of USD 1.9 trillion for fossil fuels, and redirect funds to fight climate change. The same year, the IMF calculated that fossil fuel subsidies amount to USD 10 million per minute - including the health and environmental degradation costs. At the same time, subsidies for Renewable Energy Sources (RES) are approximately 50 times lower!

Pylon is a network structured with only one purpose: to create the first open, renewable energy exchange community, which will provide the energy markets with the signals and financial incentives that current energy policies and governance systems, are failing, or delaying to provide.

Users of Pylon can exchange green energy, bought directly from the RES producer and without need for intervention of intermediaries throughout the process; this is achieved through the application of blockchain technology and smart contracts. At the same time, our Pylon-Coin, which will be used for payment of all green energy transactions, is utilized within the financial eco-system that we are proposing (the Pylon Network), in order to reward the production of sustainable energy and financially support projects on sustainable technologies.

The technology to achieve our 100% sustainable development vision is out there and it works! Pylon is here to accelerate its implementation.

The following sections will go through the definition of Renewable Energy Cooperatives with their values and role in local energy policies; following this, the document goes through the presentation of the pro-

ducts developed by Klenergy and an explanation of how they interact in relation to Pylon; furthermore, the Pylon Network is introduced with its various types of participants (players), their role and how they interact through the platform, along with an explanation of how Pylon-Coin can accommodate for the acceleration of RES investments; finally, the road-map regarding the pilot project and commercialization implementation plans is presented, for different budget scenarios.

1.1 Structure of the power sector and decentralization of electricity markets

The liberalisation of electricity markets didn't result in the creation of a truly competitive market, since pre-liberalisation positions are substantially intact: investments in production capacity are capital

intensive, wholesale electricity markets are typically characterized by a small number of players, with their market share protected by high barriers to entry and sunk costs. In addition, due to inefficient governance and decision making combined with high lobbying efforts, the climate change remains a problem of critical importance, while the rate of RES implementation meets legislative barriers.

The solutions proposed in the past to subsidize renewable energy production, such as generous feed-in tariffs, public tenders and mandatory renewable portfolio standards, turned out to be ineffective if not counterproductive at all. However, in the last years, technology costs dropped, making renewable energy sources truly competitive with traditional fossil fuel based technologies.

This contrast has led conscientious citizens – especially in EU – to respond to this inertia by taking a stand and participating directly in the energy markets under renewable energy cooperatives.

2. RENEWABLE ENERGY COOPERATIVES AS MARKET AGENTS

> "User-owned and controlled business from which benefits are derived and distributed on the basis of use".
>
> *Dunn, 1988*

The Renewable Energy Cooperatives (RECs) represent a business model where citizens jointly own and participate in renewable energy projects. In this type of organization, both producers and consumers are involved as members. RECs represent a response of citizens to the market power exerted by incumbents in the electricity markets. They promote participation, economic and social development of communities by allowing the participants to engage in the decision-making of local energy policies. They represent a decentralised business model operating in a concentrated market. Their core values can be summarized as follows:

- Voluntary and open membership;
- Democratic member control;
- Education, training and information of the members to participate in decisions.

While responding to the centralised structure of the electricity markets, RECs operate in a field in which the stakes are collective: production and supply of renewable energy lead to social acceptance of renewable energy production facilities. This is achieved through the positive environmental effects, the community ownership and the participation to the decision-making process. In this scenario, citizens are more likely to engage in the collective efforts because other actors, such as stakeholders of private companies, will not monetize these efforts.

2.1 The RECs Landscape in Europe

During recent years, the conscious choice of consumers for green energy as well as, the tradition in the European organisation, has led many consumers to join energy cooperatives. There are 2,397 EU RECs, located mainly in Western Europe (Figure 1). There are very few RECs in Central and Eastern Europe due to unfavourable support mechanisms

for renewables. The most successful implementations of such coopera-tives in Europe can be found in Germany, Denmark and Austria.
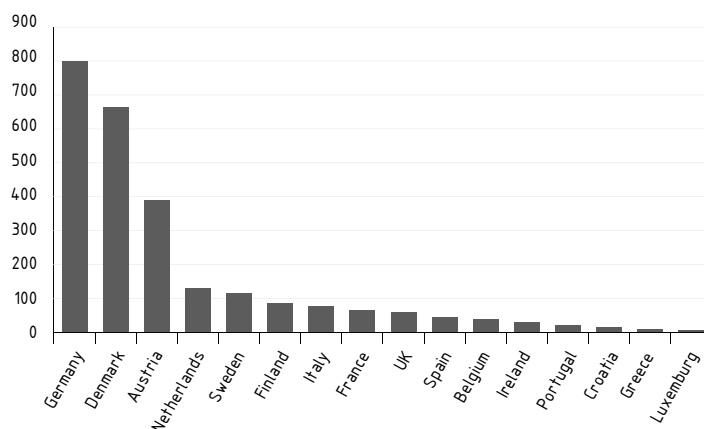

Figure 1: Number of Renewable Energy Cooperatives in EU

REScoop is the European federation of renewable energy cooperatives and it represents about half of EU RECs, having 1,240 initiatives and 650,000 participating citizens, willing to take action and support the use of renewable energy sources.

Ever since their start-up, its members have jointly invested 2 billion euro in renewable energy power plant projects for a total installed ca-pacity of 1GW. The combined annual turnover is as high as 950 million euro, and they provide sustainable jobs for more than 1,100 European citizens.

The focus of our efforts starts in Spain, due to the proximity to our la-boratories and our familiarity with the market and its players. There are currently about 20 RECs operating in Spain.

One of the most representative of these energy cooperatives, is GoiE-NER - who is a qualified and certified player in the wholesale Spanish energy market – and who is supporting the project by being the first adaptors during the pilot demonstration stage through the develop-ment of the project (Section 5).

2.2 Pylon Network and Energy Cooperatives: a resonance of posi-tive externalities

As explained in the previous sections, RECs have been identified as the perfect market agent that can benefit from the synergy between

blockchain technologies and renewable energy systems. The reasons are summarized below:

- **Gain legitimacy as market player**: as of today, RECs are not yet perceived as a legitimate market player by other market agents; by implementing a blockchain P2P network for the energy trading and distributed governance they will represent the technological forefront in the energy sector;

- **Decentralised consensus mechanism**: Pylon will offer the possibility of taking democratic, investment decisions for expanding the generation or storage capacity of green energy.

- **Shared asset management**: Pylon Network will offer tools to simplify the processes of shared ownership through transparent, safe and real-time monitoring of assets. This includes the distribution of profits or costs associated with the co-owned assets.

- **Real time energy consumption (or smart metering)**: users will be able to constantly monitor their energy consumption and be charged based on a "live" electricity price; this enables them to modify their energy habits in order to avoid consuming during periods with high electricity prices and hence, reduce the cost of electricity for the cooperative.

- **Simplify the operations of the cooperative**: with the implementation of smart metering (Metron) and Pylon wallets, it will be possible for the cooperatives to reduce the risk of their financial day-to-day operations by employing a customized billing scheme. In this way, Pylon offers to cooperatives an additional sustainability factor, the financial one.

- **Empowerment of the sharing economy through creation of trust:** the levels of trust that blokchain technology offers can be a catalyst for unlocking more flexible, sharing-economy models for the energy sector and especially, the energy cooperative model.

We believe that with the given structure, as well as the values manifested by the renewable energy cooperatives, the Pylon P2P Network could harness the development of a decentralised and international cooperative model, with mechanisms of distributed consensus and governance at its foundation.

3. KLENERGY: PRODUCTS PORTFOLIO

For the last three years the Klenergy team has focused its efforts in the development of a portfolio of products with very specific goals:

- **Push for a paradigm** shift in the energy sector, by exploiting only renewable energy sources for power production – which is more and more feasible as costs are dropping - in order to take care of the most important commodity we have on our planet: the environment;

- **Enhance the potential of energy storage**: the intermittent nature of sources like the sun and the wind makes energy storage fundamental to harness the potential of renewables in our energy systems; we developed a hydrogen storage solution – Klenergy Helios – combining existing technologies in a very efficient way to generate electricity, heating and clean fuel;

- **User empowerment through information**: as the cooperative model shows, there are many people willing to take a stand and participate actively to influence local energy policies; we want to give them the technological instruments to do it in an efficient way - both financially and energy-wise;

- **Decentralization of business decisions and governance**: empowering people to take decisions on their use of energy means also allowing them to participate to the decision of allocation of resources.

Klenergy sees sustainable technologies as a pathway, not only to a greener and less polluted planet, which is still a huge deal, but also as a pathway to a fairer and more democratic society, with equal access to resources and therefore, opportunities.

We offer two products, which allow us to have a large impact towards this belief; our flagship hydrogen battery, Klenergy HELIOS, and the first available smart meter based on blockchain technology - Klenergy METRON.

3.1 Klenergy METRON

METRON[1] is a plug-and-play, energy monitoring system, designed to give meaningful insights of the users energy consumption while offe-

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[1] www.metron.es

ring them a tool for "energy training", to become energy efficient and smart consumers. It gives them the ability to listen to their homes, by transforming it to a smart energy hub – at the commands of their fingertips through the Metron app for smartphones.

The integration of blockchain technology allows for the decentralisation of governance by offering instantaneous smart contracts for exchange of energy, payments and the easy integration of various energy consumption data; all these into a convenient and "clean" energy dashboard (iOS app/Android app).

Figure 2: Metron Energy Monitoring System App & device

3.1.1 Value proposition for METRON

METRON is a device that first of all, will give users the opportunity to participate and take advantages of Pylon Network; in addition, METRON can help its users in the following ways:

- **Smart control for home,** with personalised advices/alarm to reduce the bills. Up to 30% reduction in electricity consumption.

- **Real-time monitoring of all electrical appliances** with the simple installation of only one device.

- **Minimal operational costs** for data storage and data management (for monitoring of many properties - e.g. energy cooperatives).

- **Certify** where green electricity came from and exactly when it was produced.

3.2 Klenergy HELIOS

The flagship of our products is our hydrogen storage solution, HELIOS[2] It taps on the competitive advantages of the most sustainable and most accessible fuel. It produces hydrogen thanks to the electrolysis reaction, without emitting any pollutant at all. In that way, it can store excess electricity in the form of compressible hydrogen - which renders it a unique solution for seasonal storage applications (up to months). In the process of splitting water molecules and later using the produced hydrogen to produce electricity, HELIOS exploits the heat waste through this process, by heating up water that can later be used for space heating or domestic hot water applications.
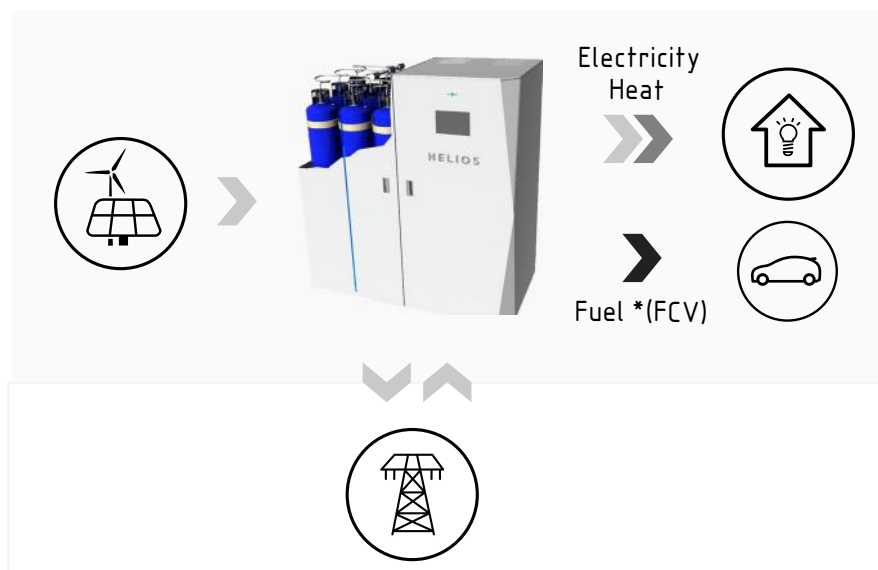
Figure 3: HELIOS unit energy flows

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[2] www.klenergy-tech.es

Heating and cooling of buildings and industry is responsible for half of the EU's energy consumption. In EU households, for example, it makes up about 79% of energy use. On average, heat demand represents 6% of their income expenditure. About 84% of this energy is still provided by polluting fossil fuels.

HELIOS offers 80% CHP efficiency and 20% lower cost of storage within the unit's lifetime (20 years), when compared to lithium ion batteries. HELIOS is the only truly flexible, plug-and-play CHP energy storage solution able to cover transportation demand, too – since hydrogen can also be used as a fuel.

3.2.1 Value proposition for HELIOS

- **Flexibility in storage capacity**: By compressing hydrogen, we can increase our storage capacity from 45kWh-el up to 170 kWh-el.

- **Flexibility in storage time**: Hydrogen can be stored for long periods - up to months - without degrading the performance or, capacity of the storage unit; this makes it ideal for seasonal storage applications, in climates where the RES production might vary seasonally.

- **Zero emissions technology**: Electricity and heat generation without CO_2 emissions. Just add water!

4. PYLON NETWORK

4.1 Introduction to the Pylon Network

There is no doubt in our days, that blockchain technology is a decentralisation tool that can disrupt many industries, other that the financial one. Energy is one of them, since typically it is a network with many actors, intermediaries and transactions, both physical and digital. And with continuously reducing prices of renewables, the production of electricity will shift towards a more decentralised base.

Blockchain technology can cover an obvious gap by offering incomparable advantages in terms of security and trust. We see blockchain technology as a disruptive tool that can be used for the complete liberalization and decentralisation of the energy market. Pylon Network has the potential to reduce the energy costs for the consumer, increase the profits for the producer/investor and make the grid operation more efficient and less demanding.

At the same time, Proof-Of-Work (P-o-W) based consensus algorithms (e.g. Bitcoin) have a downside: they require big amounts of electricity to reach consensus on the state of the network. The Bitcoin community relies on miners for its operation, which in turn, require electricity to run. In fact, according to a study that attempted to quantify the amount of electricity spent for the bitcoin community alone, the annual electrical consumption for the bitcoin network operation is way above that of Ireland.

Pylon Network combines the aforementioned advantages and at the same time, tackles the energy consumption burden that comes with P-o-W, by minimizing the energy required for the validation of the transactions and heavily depending on excess renewable electricity, which would otherwise be wasted.

Pylon Network brings together stand-alone RES facilities (not connected to the electrical grid) with all the current actors of the traditional electricity market. This is achieved through Pylon's Green Miners which rewards renewable energy no matter where it was produced (on- or off-grid). A simple representation is shown in Figure 4.
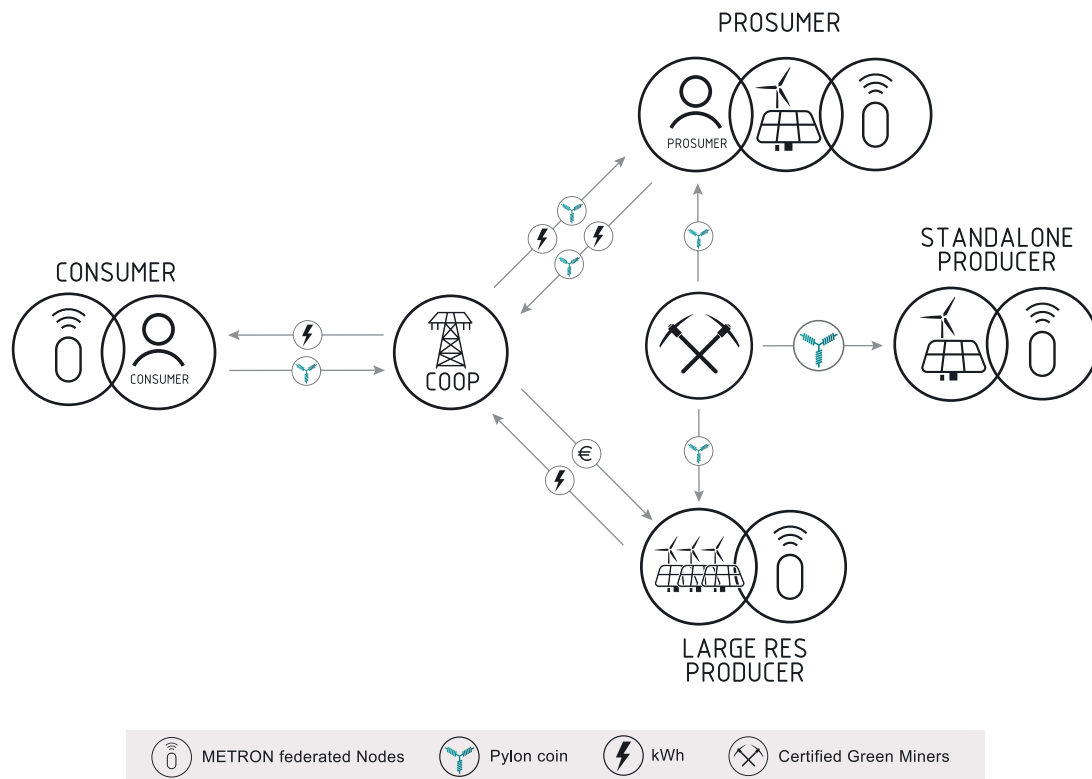
Figure 4: Flow of energy and Pylon-Coin

The next sub-sections will focus on various special aspects of Pylon Network, regarding its users and its operation, the Pylon-Coin and the Green Mining reward system.

4.2 Pylon Network value proposition

The development of the Pylon network has the goal of creating a user-friendly platform in which energy cooperatives and consumer can interact in an efficient way.

While achieving this, renewable energy production is rewarded and smart metering technology is used to give users an instrument to monitor their consumption, hence allowing them to optimize their consumption profiles while, offering an efficient tool to pay their bills.

At the same time, investors are given more incentives to invest in them, with the advantage of more attractive ROIs due to the use of Pylon Ne-

twork. They receive an additional reward for the production of RE- in the form of Pylon-Coin.

The goal of the upcoming development phase (pilot phase) will be the formulation of consensus rules and mechanisms to give a solid structure to the network while encouraging self-consumption rather than investment in energy intensive mining equipment. The following sections will go through the presentation of the different actors involved in energy, data and token flows.

4.3 Pylon-Coin value proposition

Pylon-Coins are designed to represent the most valuable energy source for the future of our societies: renewable energy. This is achieved by associating excess RE generation with Pylon's 'Green Miners' which are the backbone of The Platform (Section 4.4.1).

Pylon Network is designed to create a prosperous environment, regarding:

- The provision of financial incentives for green energy investment growth

- Decreasing payback time for RES installations;

- Guarantee extra revenues for existing installations;

- The direct exchange of cheap and certified green energy;

Pylon-Coin will demonstrate the potential value creation that comes with decentralisation of energy supply chain, investment decisions and policies.

4.4 Green Miners: The basis of Pylon Network

The Green Miners constitute the pillar of the reward system implemented in The Network. It is therefore, the vehicle that adds value to the generation of green energy, without additional burden to the energy demand.

The correct incentives are in place in order for:

- **The miners to prioritize own-consumption over consumption for "mining".** With the proposed reward system and Green Mining model, we ensure that "mining" only occurs with electricity that would otherwise be wasted - and does not add to the total energy consumption, as shown in Figure 5.

- **Encouraging investments in RES**. Give to investors (of all scales) an additional investment security by receiving an extra reward, while using Pylon-Network. This reward, which is received in Pylon-Coins, offers a reduction of the ROI.
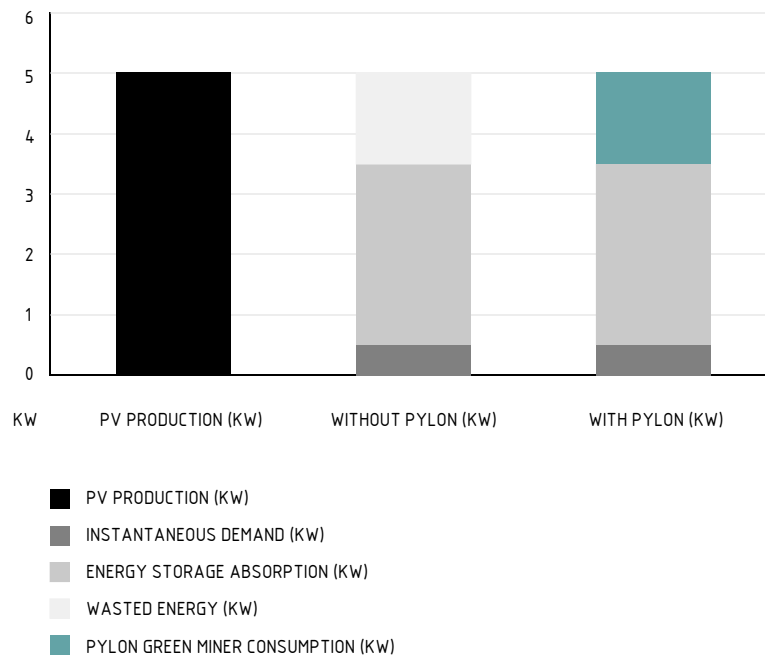

PV PRODUCTION (KW)
INSTANTANEOUS DEMAND (KW)
ENERGY STORAGE ABSORPTION (KW)
WASTED ENERGY (KW)
PYLON GREEN MINER CONSUMPTION (KW)

Figure 5: Added value for isolated customers

Our belief is that "mining" by itself does not need to be profitable; but, investment in real value-creation, should be. In Pylon Network, Green Mining only helps to decrease the payback of the renewable installations – whether grid-connected or not; in other words, incentives for additional electrical consumption or waste, are avoided. The following sections explain the concept of Green Mining in more detail.

4.4.1 Creating a Non-Competitive, Green Mining Environment

The early stages of the development will be focused on testing different consensus protocols alternatives. The goal is to define a set of consensus rules easily verifiable by the nodes but not as energy intensive as the traditional Proof-of-Work; we will initially achieve that by using federal nodes based on a hybrid model between Proof-of-Cooperation (to validate transactions) / Proof-of-Work (which certifies and reads the consumption of surplus energy on which the mining reward is based).

The Proof-of-Cooperation allows us, not only to eliminate the competitive nature of the miners but also, to eliminate high cost of computing equipment.

This is achieved by replacing them with a certified Metron node, able to absorb and monitor all the excess electricity available. Based on this rationale, the reward given to the Green Miners is distributed in a way that all of them (Section 4.5) receive the same electricity price per kWh of generated renewable energy.

This price is determined by taking as a reference, the hourly electricity price in the national wholesale market.

In that way, Green Miners receive the reward as a complement to the wholesale price and get compensated for any discrepancies in legislation.

4.4.2 The Players of Pylon Network's Green Mining

Pylon Network's Green Miners can be divided in categories:

- **RES Investor:** Will finance new plants for clients unable to afford it. Clients will pay him in Pylon-Coins for the electricity they receive from the RES plants. By participating to the Pylon Network, the investor has the opportunity to maximize the revenues from the RES plant by getting Pylon-Coins as reward for the energy that the clients are not using. They might monetize this value or store it to maximize benefits from increased value. With this model, the investor would have an extra benefit on a 25% in the form of Pylon-Coin that could either be exchanged for FIAT currencies or maintained as Pylon-Coin for future use in Pylon Network. As in all cases, METRON is the gateway to Pylon Network.

- **Standalone Producer**: They represent the pillar of the network; the surplus electricity at their disposal is often wasted (since they are not connected to the grid); by participating in the Pylon Network they have the opportunity to monetize the surplus and reduce payback time of the RES installation up to 25%. The reward system will be designed in order to emulate a feed-in tariff, as if they were connected to the grid , providing a more secure investment environment for stand-alone applications. METRON will allow to keep track of the (excess) energy and Green Mining reward flows;

- **Large Scale RES facilities**: Producers of renewable energy that

are connected to the grid and are authorized agents on the wholesale energy market will also get rewarded for the energy injected into the grid. Their participation in the Pylon network will be rewarded to harmonize renewable energy incentives, wherever this is not provided by the (inter)national legislative framework. METRON will allow to keep track of the energy and reward flows;

• **Grid connected RES prosumers**: The reward is calculated in the same as in the previous cases, i.e. in order to compensate for any difference between purchase and sale of electricity by the prosumer. METRON will allow to keep track of the energy and reward flows;

• **Metron Nodes**: any type of consumer or network participant equipped with a Metron energy monitoring system will take part in the implementation of the consensus rules by confirming blocks of transactions. Due to their minimal electrical consumption, no reward will be given to Metron nodes. By running a Metron node, you can contribute to make the Pylon Network transparent, while improving your energy consumption;

• **Investor in digital currency**: buy and sell Pylon-Coins via exchanges services.
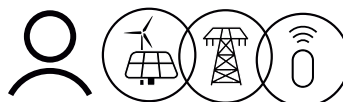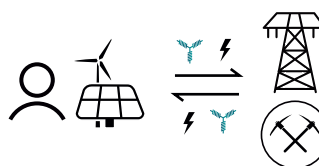
CONSUMER

– COOP MEMBER
– METRON CERTIFIED NODE
– ENERGY SAVING WITH SMART
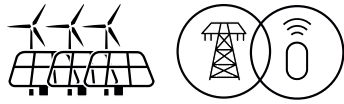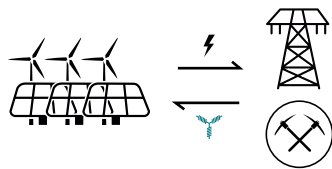 METRING
– PAY BILLS IN PYLONS

PROSUMER

– COOP MEMBER
– METRON CERTIFIED NODE
– REWARDED FOR INJECTED
  ENERGY TO THE GRID
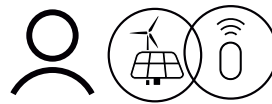– DECREASES PAYBACK TIME
  BY JOINING PYLON NETWORK

LARGE RES PRODUCERS

- COOP MEMBER
- METRON CERTIFIED NODE
- REWARDED FOR INJECTED ENERGY SURPLUS
- DECREASES PAYBACK TIME BY JOINING PYLON NETWORK

STANDALONE PRODUCER

- METRON CERTIFIED NODE
- SURPLUS ENERGY REWARDED FOR 'GREEN MINING"
- DECREASES PAYBACK TIME BY JOINING PYLON NETWORK
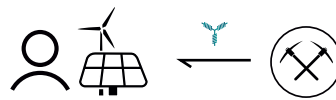- POSSIBILITY OF CO-OWNING POWER PLANT

Figure 6: The different players involved in the Pylon Network

4.5 Token- and reward- flows among the Pylon players

Figure 7 represents the flows of Pylon-Coins, energy and FIAT currencies in the Pylon Network. Let's examine how it impacts the various participants:

- **Consumer**: buys electricity from the energy cooperative using Pylon-Coins;

- **Prosumer**: Buys and sells electricity to the energy cooperative using Pylon-Coins; gets a reward in Pylon-Coins for the energy sold;

- **Standalone producer**: gets a reward in Pylon-Coins for surplus electricity he/she is not consuming;

- **Large scale RES producer**: sells electricity to the energy cooperative via bilateral contracts in FIAT; at the same time he/she receives a reward in Pylon-Coins;

- **Energy Cooperative**: in charge of distribution of electricity to its members; accepts payments of electricity bills in Pylon-Coins; negotiates bilateral contract with renewable energy producers;

- **Investors in Pylon-Coins**: They can trade Pylon-Coins in crypto-

currency exchange markets.

- **Investors in RES plants**: They finance RES installations for consumer and charge them in Pylon-Coins for the energy they use. Receive a reward in Pylon-Coins for the energy surplus that is not consumed, in order to decrease investment payback time.

Some example cases regarding the reward distribution and investment return from Green Mining can be found in Appendix A & B.
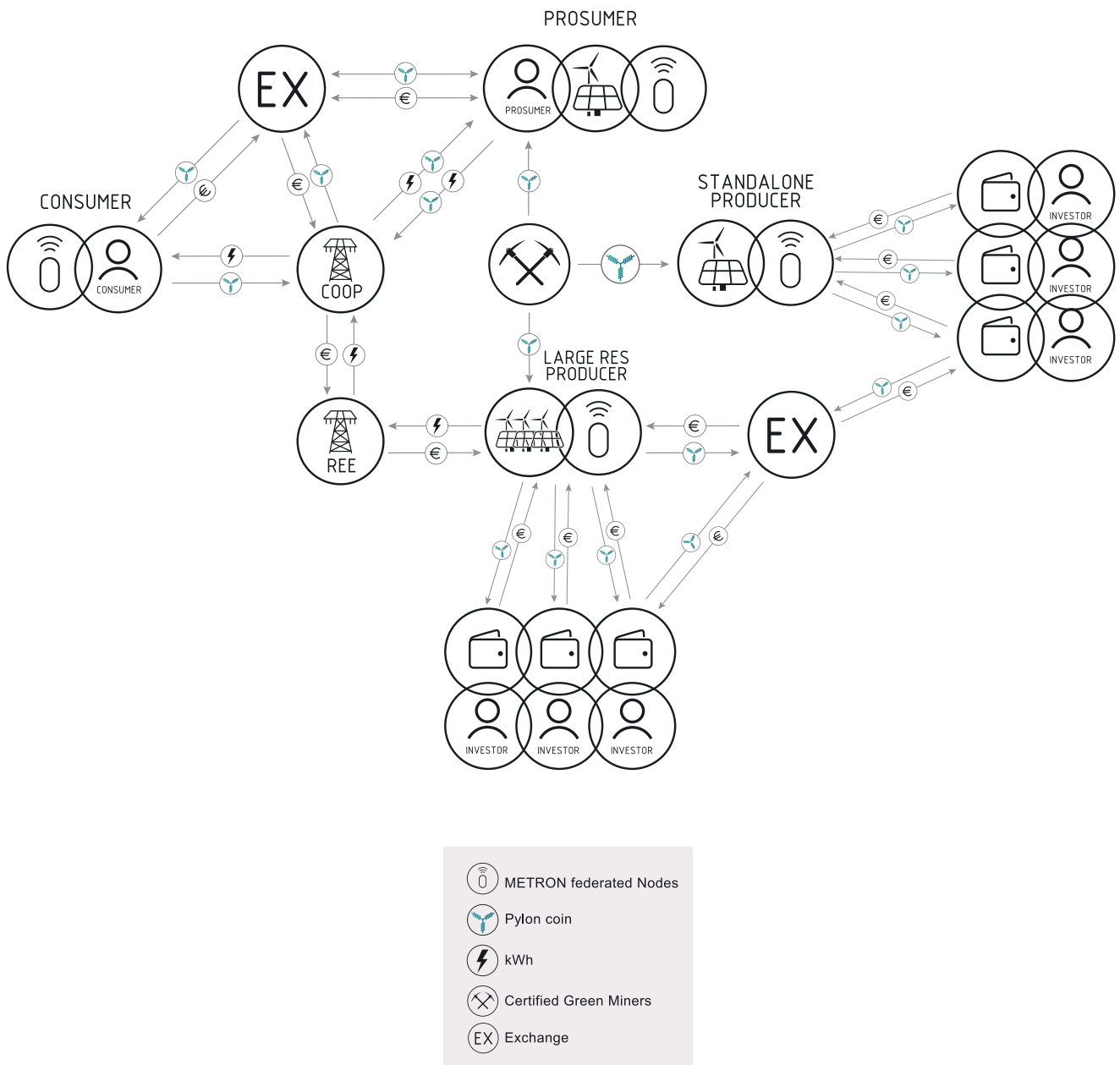

Figure 7: Flows of Pylon-Coin, energy and FIAT.

5. ROADMAP

Pylon will reach the commercialization-readiness level, after the pilot demonstration stage is completed successfully, through the support and collaboration with GoiEner.

Since GoiEner has also the right to buy/sell electricity to the whole-sale market, the blockchain algorithm will be developed in such a way to integrate both areas of electricity trading; buying/selling from/to the wholesale market but also, the transactions with its customers (the consumers).

In particular, our pilot- and commercialization-validation efforts will be focusing on the following two tasks:

- Development and testing of procedures to certify green miners and test innovative consensus mechanisms;

- Study and simulate - Prove different reward mechanisms to sustain investments in renewable, storage technology and participation in the platform, while scaling up.

This will enable it to be applicable on all scales and to integrate all players of existing market structures, in a decentralised energy exchange platform. We want to offer an open energy exchange market, in which all technologies can participate and compete on equal terms.

Figure 9 shows the roadmap for achieving the most important milestones in various budget scenarios, as represented in Figure 8.
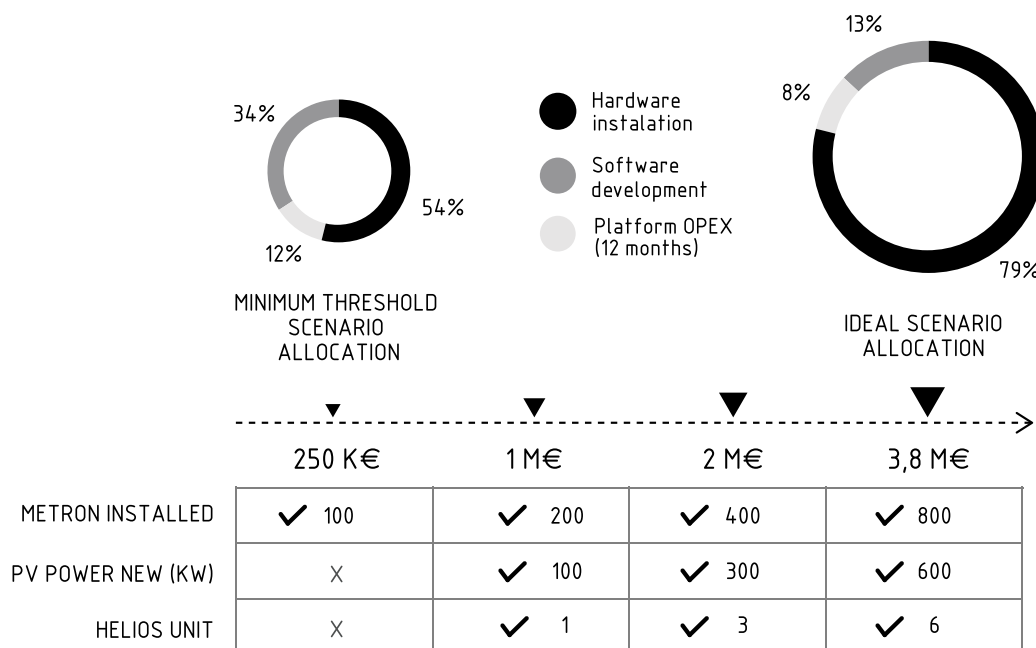

	250 K€	1 M€	2 M€	3,8 M€
METRON INSTALLED	✔ 100	✔ 200	✔ 400	✔ 800
PV POWER NEW (KW)	X	✔ 100	✔ 300	✔ 600
HELIOS UNIT	X	✔ 1	✔ 3	✔ 6

Figure 8: The different budget scenarios
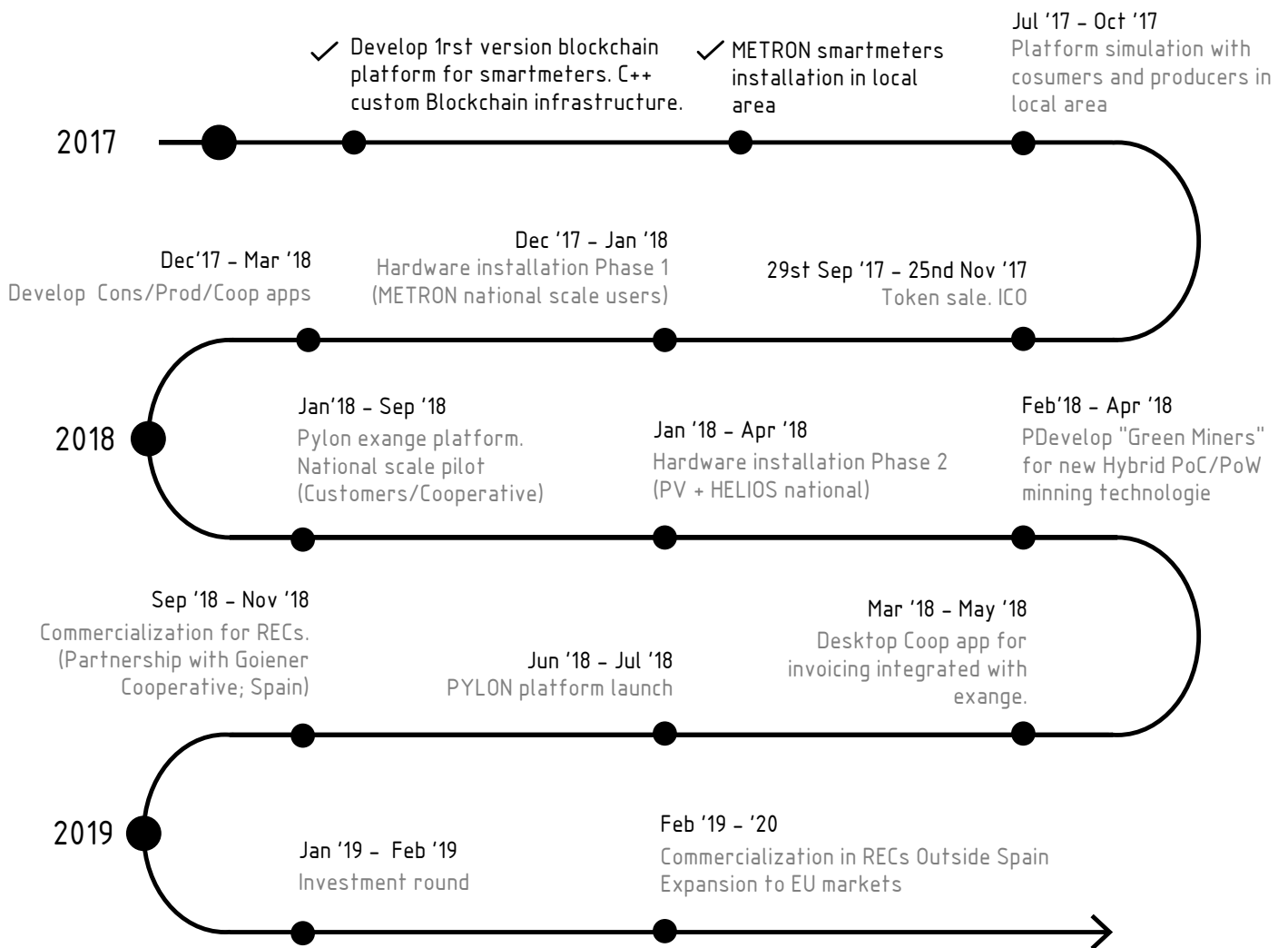
Figure 9: Roadmap

5.1 The coins of Pylon Network

Initially, (during the initial token offering) Pylon-Token is based on Ethereum and is the currency that will be used to raise the funding for the project development. During that period, Pylon-Token would be used by investors, making them participate in the project, which will grow as its development progresses, but not for the transactions amongst the players of the Pylon Network - since Ethereum imposes a fee for each transaction.

For the Pylon Network purposes, Pylon-Coin is used, based - this time - on the core algorithm of FairCoin. This ensures that the numerous

operations and energy transactions are carried out more economically and more energy-efficient.

The Pylon-Token and Pylon-Coin run in parallel; the first, expressing the value of Pylon Network and the latter, expressing the value of the electricity being traded and rewarded through Pylon Network.

5.2 The sale of Pylon-Tokens

We have pre-mined 3.750.000 Pylon-Tokens from which, 3.250.000 will be offered at the token sale. The remaining 500.000 will be used to fund all operations of the project development by the team and partners.

Right before the launch of PYLON-Token sale, the exchange relationship will be expressed in ETH/PYLON-Token based on the €/ETH rate, in that moment.

Table 1 summarizes the specifications of PYLON-Token and the token sale.

Parameter	Value
Operation Platform Name	Pylon Network
Token Name	Pylon-token
Symbol	PYLNT
Total premineded token	3.750.000
Tokens Offered	3.250.000
Token type (ICO)	Ethereum-based
Coin Name	Pylon-Coin
Pylon-Coin type	HYBRID: PoW & PoC
Token sale – Opening day	29th September '17 12:00':00" (CET)
Token sale – Closing day	02nd November '17

Table 1: Specifics of Pylon-Token Sale

5.3 The investor of the Initial Token Sale

Investors participating in the initial sale of tokens will receive a share of the pre-mined Pylon-Tokens. This share will represent the stakes of Pylon-Network platform, including both Hardware and Software installations.

Since the pilot stage will include these installations (with the corresponding Green Mining systems), profits will be generated in the form of reward in Pylon-Coins - once the commercialization phase begins. Therefore, the investor that has participated in the initial token sale will also receive the share of Pylon-Coins that correspond to the stake of participation in Pylon Network.

The distribution of the benefits generated by the first installations is shown in Figure 10 below:
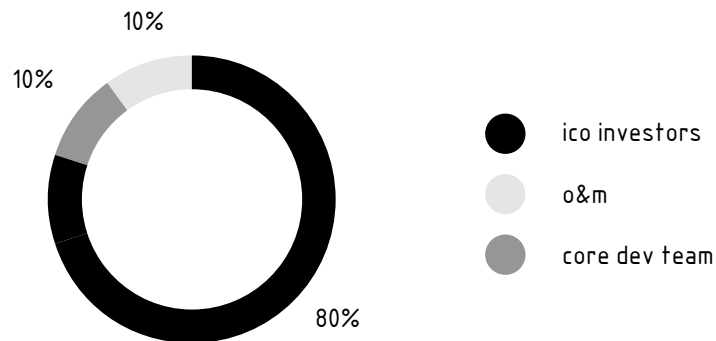

10%

10%

80%

● ico investors

○ o&m

◐ core dev team

Figure 10: Reward distribution of Pylon-Token investors during commercialization of Pylon-Coin

5. PARTNERS

IT & Blockchain

Entropy Factory: Entropy Factory are a group of project developers from Fintech, Web Security, BlockChain.

MarfelDesign: Marfel Design is a company dedicated to web development and application programming.

Chip-Chap: Chip-Chap is a payment manager with extensive experience, offering financial solutions to individuals and companies using state-of-the-art technology.

Energy Sector

GoiEner GoiEner is a cooperative project of generation and consumption of renewable energy with the objective of recover the energy sovereignty.

Instituto Ingeniería Eléctrica The IIE, approved by the Polytechnic University of Valencia (UPV) on April 10, 2001, has the objectives of multidisciplinary approach to the different R + D + I areas in the field of energy.

QKSOL: Spanish company, with more than 15 years of experience in energy engineering projects, providing global solutions.

Metering Hardware

Smappee: Smappee develops innovative solutions that promote sustainable energy consumption. Its smart monitors analyze the consumption of solar energy, gas, water and electricity and were the first to measure electricity consumption at the level of individual devices identifying all important household appliances.

H2 Tech & Manufacturing

GreenHydrogen: GreenHydrogen is a large Danish company that offers advanced solutions in electrolysis and hydrogen processes for renewable energy applications and use in the industry.

Ewii: The EWII Group is composed of several subsidiaries, each linked to the central EWII areas in the fields of electricity, water, heating and broadband fiber. Specialized in hydrogen fuel cells.

GreenGrouping: Green Grouping is a company specialized in developing energy solutions and sustainability management. They have experience in multiple hydrogen-based projects.

Ecoinvestment & Promotion

Ecrowd: ECrowd! Is the online platform for the collective financing of profitable investments with a positive impact on society and the environment. In addition, investing directly in these projects contributes to the real economy and a more sustainable world.

Ecoindus: Ecoindus is the great community of professionals and users of ecoindustry, sustainable development and eco-innovation that connects all those involved in the development of a global green economy.

Segofinance: Sego Finance is a business group specializing in corporate finance via equity crowdfunding and crowdlending, and financial advice.

7. CONCLUSION

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With this token sale, we are putting an open call for the initiation of an ambitious project. We have presented how Pylon Network can become a tool for the empowerment of sustainable technologies and the acceleration of their deployment. We have also described what steps will be taken in order to demonstrate the operation of Pylon Network.

This token sale is special not only because it is the first one that offers a digital crypto-coin (token) with real value; it is also unique in the sense that its development is associated with hardware installations (PV, energy storage etc.) and management of a valuable commodity – renewable energy. This makes its investment value more apparent and substantial when compared to most token sales.

We want to demonstrate the advantages of blockchain technology combined with decentralised energy generation, through an implementation of our products portfolio. We will start by demonstrating it within energy cooperatives with whom we share the same values - and are already supporting us in this project. Our aim will be to present a successful, validated model, with the ability to scale it up and apply it to various branches of the energy sector and all places of the world.

We offer a new, disruptive model for the transaction of energy, incorporated within a financial eco-system: Pylon Network is governed by a set of trust-creation mechanisms that promote/reward the expansion of sustainable, decentralised energy generation and management.

Pylon Network will be the nexus of the energy and the crypto-currency markets; an open platform based on the first sustainable, decentralised currency, designed to nourish the de-centralisation of the global energy markets.

8. APPENDIX

Example case 1: Standalone Photovoltaic Plant

A standalone PV plant of 6 kWp produces 24 kWh/day [3] (Valencian region). It is a common phenomenon that – especially during summer, batteries are fully charged and they store only 10kWh of the 24kWh produced; this means that the remaining 14kWh simply go to waste. By participating to the Pylon Network, this surplus can be monetized by receiving Pylon-Coins, as part of the Green Mining reward program. The amount of rewarded Pylons is determined instantaneously, depending, on (i) the wholesale electricity price of the national market, at every moment, and (ii) the exchange rate between Pylon-Coins and FIAT currencies (e.g. €/PYLON).

The goal is to maintain an equal, "universal" reward within each energy market, even for the stand-alone, decentralised energy producers.

For the Spanish example, electricity prices in the free market are around 0.05 euro/kWh[4]. This means that the standalone plant owner, with an estimated production cost of 0.30euro/kWh, will always prefer to consume this energy rather than using it for feeding power-hungry computers (traditional miners), on a 24/7 basis; with the Green Mining of the Pylon Network there is no additional electrical load added as burden to the stand-alone user while, he/she gets rewarded for the –inevitable– excess electricity that goes to waste.

Let us consider the following example; conversion formula kWh/PYLON:

- Number of kWh of energy surplus: N;
- Real time Pylon price: P;
- Electricity market price in the national market pool for 1 kWh: e;
- Correction factor dependent on country legislation and type of installation: K;

$$PYLON(kWh) = N\frac{e}{P}k\,[PYLON]$$

In this example, K is equal to 1, under the hypothesis that no other contribution is given for this energy (e.g. green energy subsidies). Assuming the price of Pylon to be €1.5 at the moment of the energy transaction and the price of kWh in the market pool at 0.05 €/kWh, the plant owner will earn (0.333 PYLON), which correspond to 50€cent. In few words, the standalone producer is able to"sell" –virtually– excess generated electricity on the wholesale market.

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[3] http://re.jrc.ec.europa.eu/pvgis/
[4] http://www.omie.es/inicio/mercados-y-productos/mercado-electricidad/

The formula is the following:

$$PYLON(kWh) = 14\frac{0.05}{1.5}1 = 0.467\,[PYLON]$$

If the price of Pylon changes, the reward will be fixed in € per kWh, to represent the hourly wholesale market price.

Let's suppose that for the same installation, the cost of kWh is €0.05 and the price of Pylon is €5; by applying the previous formula we get:

$$PYLON(kWh) = 14\frac{0.05}{5}1 = 0.14\,[PYLON]$$

Is this case the reward in Pylon is lower for the same amount of energy; but the change in \euro s makes it possible to maintain a constant reward for each kWh.

Payback time for a standalone PV plant participating in Pylon Network:
- Cost of PV plant of 6 kWp and batteries (10 years useful life) : €18.000;
- Average daily energy production: 24 kWh;
- Average daily energy consumption: 10 kWh;
- Annual energy production: 8870 kWh;
- Annual average energy consumption: 3650 kWh;
- Annual energy surplus: 5220 kWh
- Average annual benefit due to Green Mining: 261 €/year.

Taking into account that the batteries will need to be replaced in 10 to 12.5 years, generating an additional cost estimated to be € 8000 the installation cost with a 25 years horizon is € 26000; by participating in the Pylon Green Mining the user will be able to get an additional revenue:

- Installation cost WITHOUT PYLON (25 years): €28.000 /25 years = 1.120 €/year.
- Installation cost WITH PYLON (25 years): (€28.000 - €261 *25yrs) / 25 years= 859 €/year
- Cost per kWh WITHOUT PYLON: €1.120 / 3650 kWh = 0.3068 €/ kWh
- Cost per kWh WITH PYLON: €859 / 3650 kWh = 0.2353 €/ kWh

By participating in Pylon Network the plant owner could save up to 23.3 %. If this installation was financed by a private investor, this percentage is considered as a direct investment return for him.

Example case 2: Grid Connected Photovoltaic plant

A grid connected PV plant of 100 kWp installed produces 400kWh/day (Valencian region). The lifespan of such installation is typically 25 years.

Since we are now considering a grid-connected installation, all the energy produced can be utilized (injected to the grid). In this case, if the plant owner chooses to participate to the Pylon Network, he/she will get a reward as well. This reward will decrease the payback time of the plant and make the investment more attractive.

The objective is to build a system of incentives for investments in renewable energy and speed up full RES penetration in the grid. The following paragraph deals with preliminary calculations for the second example case.

Conversion formula kWh/PYLON:

- Number of kWh of energy surplus: N ;
- Real time Pylon price: P ;
- Electricity market price in the national market pool for 1 kWh: e ;
- Correction factor dependent on country legislation and type of installation: K ;

$$PYLON(kWh) = N\frac{e}{P}k[PYLON]$$

In this example, K is equal to 0.2, assuming that the plant is already receiving a payment from an energy cooperative for the energy sold via bilateral contract; let's assume that the electricity price agreed in the contract is 0.04 €/kWh , according to the current prices in Spain.

Therefore, to compensate for the difference between the bilateral contract price and prices in the market pool, the producer will receive Pylons as a reward.

Assuming a price of Pylon of €1.5 at the time of the energy transaction and a cost per kWh in the Spanish market pool of 0.05 €/kWh, the owner of the grid connected facility will get (2.6667 PYLON), corresponding to € 4, hence 0.01 €/kWh extra per kWh injected to the grid. This situation is equivalent to selling energy in the wholesale market at 0.05 €/kWh; the formula is the following:

$$PYLON(kWh) = 400\frac{0.05}{1.5}0.2 = 2.6667[PYLON]$$

Payback time for a grid connected PV plant participating in Pylon Network:

- Cost of a grid connected photovoltaic plant of 100 kWp (25 years): €98.000
- Daily average energy injected: 436 kWh/day;
- Total annual energy injected: 159000 kWh/year;
- Annual revenues from energy sold to cooperative: 6.360 € /year.
- Payback time WITHOUT PYLON: €98.000 / 6.360 €/year: 15.4 years
- Total profits within lifetime of investment (25 years) WITHOUT PYLON: €61.056
- Annual extra revenues participating in Pylon-Network Green Mining: 1.590 €/year.
- Payback time WITH PYLON: €98.000 / (€6.360 + €1.590): 12.32 years.
- Total profits within lifetime of investment (25 years) WITH PYLON: €100.806

By participating in the Pylon Network, the PV plant owner of this example could reduce the payback time of the investment up to 3 years, with a higher revenue of up to 65% throughout the lifetime of the facility (25 years).